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ABSTRACT

A computer-Based management game was designed as both an orientation and a training device for new department heads and others who might profit from a better understanding of some of the significant decision elements in the administration of an academic department. Each game participant serves in the same capacity and is required to make two decisions per year for a 5-year period. The participant is provided with a hypothetical academic department, an initial roster of several faculty and a teaching obligation. Decisions then require a specification of individual teaching assignments for the faculty including number of courses, level of course assignments, e.g., lower division courses, upper division courses, and/or graduate level courses, as well as matching faculty preferences and capabilities with departmental speciality offerings. The game mathematically relates all decisions to such department characteristics as faculty satisfaction, the ability of the department to attract graduate students, levels of research and scholarship, teaching effectiveness and a general composite measure of department reputation. (Author/MJM)

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THE ACADEMIC DEPARTMENT GAME

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The department head (or chairman) in a university may have reached that position as a result of demonstrated teaching and/or scholarly ability. It is unlikely, however, that these capabilities will have much relevancy to the administrative responsibilities of the position. In fact, the traits cited as desirable for the position may not emphasize (or perhaps even include) any "administrative" capabilities.

Many individuals are vaulted into leadership positions within a university with little appreciation for the spectrum of problems and responsibilities which will confront them. Once in the position, the individual can only learn through experience. In an attempt to improve upon this situation, some professional societies, e.g., the American Society for Engineering Education, offer seminars to assist the aspiring or new department head. These seminars attempt to familiarize the department head with the broad range of both administrative and academic problems and the framework for solutions. Similarly, many institutions offer some kind of introductory seminars for new department heads for the purpose of acquainting them with practices, procedures and requirements of the job. In this paper we shall discuss yet another possible vehicle for training the academic department head.

Under a grant from the EXXON Foundation, a computer-based management game has been developed which captures a number of the significant decision situations confronting the academic department head in a university. Each game participant serves in the same capacity--as Head of the Department of Statistics--and is required to make two decisions per year--one at the start of each semester--for a five year period. The participant is provided with a hypothetical academic department, an initial roster of several faculty and a teaching obligation. Decisions then require a specification of individual teaching assignments for the faculty including number of courses, level of course assignments, e.g., lower division courses, upper division courses, and/or graduate level courses, as well as matching faculty preferences and capabilities with departmental specialty offerings. The game mathematically relates all decisions to such department characteristics as faculty satisfaction (and willingness to stay or leave), the ability of the department to attract graduate students, levels of research and scholarship, teaching effectiveness and a general composite measure of department reputation.

THE SETTING

The game is structured within the State University of Id, a typical land grant institution. The academic arm includes, in addition to the College of Arts and Sciences, a number of other colleges, including agriculture and engineering. The Department of Statistics is described as having a long history of providing both instructional and research services to agricultural and engineering faculty and students, as well as operating an established academic program for its own majors. The department enjoys a good, if not outstanding, reputation both on the campus and among peer departments at other institutions.

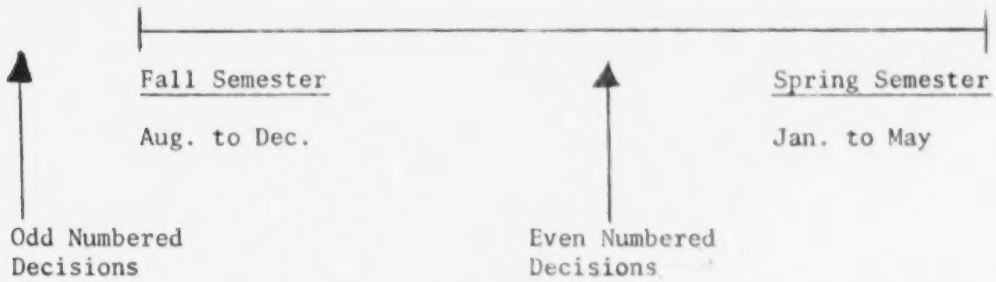
At the present time, the department has a complement of eight faculty in the different ranks and some with and some without tenure. The department may increase (or contract) in size over the next five-year period, depending in large measure upon its success in securing outside research funding and the enrollment in its graduate student program.

THE DECISIONS

The objectives of the department have to be accomplished through the faculty that constitute that department. The critical decisions in this simulation exercise revolve around the recruitment and retention of faculty and the assignment of workloads.

The institution operates on a semester basis (two semesters constitute an academic year). For purposes of the game, two decisions are made each year, or a total of ten decisions are made over the five-year gaming period. The first decision is made just prior to the start of the fall semester, the second decision is made just prior to the start of the spring semester, the third decision is then made prior to the start of the fall semester of the second academic year, and so forth. This can be seen as follows:

Academic Year



It is assumed that the department head can function in a "strong leadership situation." If, as in many university settings, there is an element of senior faculty involvement in the decision process, it will be assumed that the persuasive powers of the department head are such that his will can be accomplished.

The Faculty

At the beginning of the game, the department head is provided with a "profile" of each of his faculty. In addition to a personal sketch of the individual, information concerning his professional interests and abilities can also be gleaned from this information. Similarly, in the recruitment of potential faculty, an indication of an individual's personal and professional outlook is provided. In the case of existing faculty, this is the type of information a new department head would ordinarily obtain from personnel folders and discussions with the Dean and his staff. In the case of potential

faculty, the information would be available from friends and colleagues at other institutions who are acquainted with the individual in question. Two "typical" personal sketches are included below:

Dr. John Ubelski has taught for fifteen years and is currently a tenured full professor. He is 40 years old and has taught undergraduate courses in all areas of statistics. While originally trained in stochastic processes at Greenbrier Tech, he also is interested in experimental design and analyses. While not inherently bright, he is considered a "plugger" who tends to be quite yielding to student demands in class. His vita shows an average output but a majority of his publications have appeared in nonrefereed journals. He is quiet and resents being pressured. In general, his thin skinned personality causes him to withdraw from any social contact that he perceives as threatening.

Dr. Peter Low is 33 years old, an associate professor and has taught for seven years. His specialty is experimental design with minor interest in nonparametric statistics. While he has expressed specific interest in teaching graduate courses, he will, if required, teach undergraduate courses. It is reported that he is a poor teacher. He received his Ph.D. from North East State where he was considered one of the finest prospects ever graduated. As of yet, he has not "blossomed" as a scholar. He has, however, expressed a taste for committee work. At the present, he has not directed a thesis. He is friendly, quite disorganized, and not overly respected by a majority of his peers.

The specific types of required decisions are presented as follows:

Teaching Assignments (each semester)

The department has a teaching obligation at both the undergraduate and the graduate level. Service and introductory courses -200 level, are taught to sophomores. Beyond this, junior -300 level, senior -400 level, graduate -500 level and advanced graduate -600 level courses are taught in each of three areas: 1) Stochastic Processes, 2) Design and Analysis of Experiments, and 3) Non Parametric Statistics. The introductory courses and undergraduate specialty courses are taken both by statistics majors and by students enrolled in other programs, e.g., mathematics, electrical engineering, agricultural economics and so forth. For purposes of this game (and the five-year time span), the number of courses that must be offered each semester can be considered to be fixed. If an increase in enrollment is to occur, it will have to be accommodated through larger enrollments in the existing and appropriate courses. Beyond the number and assignment of specific courses, however, graduate students majoring in statistics will enroll in Stat. 599 - Thesis, and Stat. 699 - Dissertation. The amount of Stat. 599 and Stat. 699 credit will be seen to fluctuate in amount and will be directly dependent upon the graduate student enrollment--a variable in the game.

For all intents and purposes, the assignment of this thesis and dissertation workload will be found to be out of the hands of the department head. In effect, a student interested in working with a specific professor on his thesis or dissertation will come to an agreement with that individual, and

these hours will be noted as a teaching assignment, but one over which the department head exercises no control. As an example, the department head may find that Assistant Professor Taylor is already committed to working with three M.S. level graduate students for a total of nine hours of thesis work. Course assignments can obviously be made in addition to this workload. However, the assignment of these three graduate students, and their resulting thesis workload, will not be a decision variable under the control of the department head.

In addition to a teaching workload, some faculty engage in sponsored research and a portion of their salary is funded accordingly. This percentage is also assumed to be out of the immediate effective control of the department head. As another example, Assistant Professor Taylor may be involved in a research project calling for 20 per cent of his time. In effect, Taylor has managed to secure research funding to further his research interests and to assist in the support of graduate students. This will likely have grown out of a proposal submitted by Taylor to a sponsoring agency and the subsequent funding of that proposal. In point of fact, the department head can certainly encourage or discourage this sort of activity. For purposes of the game, he will be able to encourage research funding through: "release time" or reduced teaching loads in order to generate proposals; and a reward system that encourages securing outside funding.

The decision maker (department head) must assign specific courses to faculty. He must recognize that different faculty members have different subject matter interests, e.g., Stochastic Processes, and that they may also have a preference for teaching different level courses, e.g., upper division versus graduate level courses.

Within the State University of Id, a full teaching-research load consists of twelve hours plus some service to the department, the university and/or the profession. Twenty-four hours of thesis or dissertation is considered the equivalent of a three-credit hour course. In practice, it is not uncommon for less than twelve hours of equivalent course work to constitute a full-time workload. However, the final decision in allotting teaching assignments is made by the department head.

The size of the department is assumed initially to be eight faculty. The size can be increased through the securing of additional research funding and/or additional graduate student enrollment. As has been already mentioned, the course loading is assumed fixed over the five-year time span of this exercise. The size of an individual class may increase, but this will not influence the faculty positions made available to the department. However, if the number of hours of thesis and dissertation increases, this then may be grounds for providing the department with additional faculty positions. Thus, any increase or reduction in the size of the existing faculty will occur as a result of increases or decreases in the amount of research funding and support of faculty and the number of graduate students enrolled in thesis and dissertation work.

Salary Increase Recommendations

At most universities, each spring semester, a decision is made regarding the allocation of available salary increase monies for the next academic year.

While this decision is likely to be made during the spring, and, in some instances, even during the summer months when the state legislature is late in appropriating monies for higher education, in our exercise it is assumed that the decision is actually made just prior to the start of the spring semester. The recommended salaries then become effective with the beginning of the next academic year--the fall semester.

To assist the department head in making salary increase recommendations, a report of faculty productivity through the previous calendar year is provided. The department head will receive a report indicating individual teaching effectiveness and scholarly productivity, and he can record research activity in terms of time allotted to research projects. By way of ascertaining specific increases, the department head will receive a flat sum of money which may be distributed across those members of the faculty that are on duty during the current spring semester and that are anticipated will be on hand through the next academic year. Faculty leaving and new recruits are obviously not considered.

Recruiting

The department head is limited to the following proportions of faculty by rank: No more than approximately one-third can be in the full professor rank and no more than two-thirds should be in the full and associate professor ranks. While these proportions may appear arbitrary, they are not unrealistic in that some limitations in salary and budget for the department will likely be felt and as good a measure of control as any can be achieved through limiting the number of faculty in higher ranks. This has been done in the game.

With each pre-fall semester decision form, the department head will be notified of the number of faculty positions available during the following academic year (the year after the forthcoming academic year). He will then be able to ascertain whether or not it will be necessary for him to recruit faculty during the current academic year in order to fill vacancies or expanded positions for the succeeding year and he will do so as follows: He will be informed at this time whether or not any current faculty have submitted resignations effective at the end of the coming academic year. He should know if he intends to recommend the non-reappointment of any non-tenured professors, associate professors and assistant professors. Finally, he will have to anticipate his decision halfway through the current year to non-reappoint any instructors. With this information available and/or projected, he will know whether or not he needs to attract additional faculty to his department.

The method of recruiting must include a maintenance of the above mentioned rank restrictions. Obviously, in recruiting, consideration must also be given to the need for interest and expertise in the three separate areas of statistics. As a result, the department head indicates his decision on the decision form for the fall semester by specifying the rank he is seeking within the area of interest. As an example, the department head may indicate a request for one associate professor with an interest in stochastic processes and one assistant professor with an interest in non-parametric statistics. This "need" will then be assumed to be communicated to interested parties through both formal and informal communications with other statistics

departments and through the appropriate professional and technical societies. The department head will also report how many interviews he would wish to schedule through the year, regardless of the number of responses that are received. As an example, the department head may also report that he would schedule a maximum of some four interviews for the two vacancies he intends to fill next fall. The number of respondents and potential candidates for the vacant faculty positions will be determined by the number of maximum interviews the department head wishes to schedule as well as the reputation of that department.

With the beginning of the spring semester, the department head will be provided with a listing of those faculty that desire to be considered candidates for the vacant positions. This information will be provided to the department head in the form of specific personal data sheets and resumes. The department head will then indicate his recruiting preference in rank order. He will report that faculty member that would be his first choice, his second choice, and so forth.

While the department head is a party to the decision to extend an offer, and his recommendation regarding rank is included in the offer, he is not involved in the salary discussion. In effect, salary levels are established at the level of the dean and these are assumed to be competitive with other institutions. The dean then extends the offer.

The results of this recruiting effort, including the indication of recruiting preferences, become known with the beginning of the next fall semester and the listing of faculty available for teaching assignments. In effect, the request for faculty candidates (by rank and area of interest) is made prior to the commencement of the fall semester, the expressions of interest are received prior to the start of the spring semester, and a recruiting preference is reported by the department head at that time. The results of the process are then made known prior to the allotment of teaching assignments with the next fall semester.

Non-Reappointments

The State University of Id has a stated tradition of academic freedom. It accepts fully the "1940 Statement of Principles on Academic Freedom and Tenure" of the AAUP as a working basis for assuring the rights and responsibilities of its faculty members. When a faculty member joins the university, he does so on a probationary basis. Tenure normally follows the probationary period of employment, and the probationary periods are as follows:

Professor - three years
Associate Professor - four years
Assistant Professor - seven years
Instructor - seven years

Service at other universities is credited against the above maximum time limits for the probationary period in the following manner:

Professor - usually no credit
Associate Professor - usually no credit

Assistant Professor - year-for-year credit up to a maximum of three years' credit
Instructor - year-for-year credit up to a maximum of three years' credit

When a faculty member is not granted tenure, he must be notified at least one year preceding the end of the probationary period. In effect, if a faculty member is to be denied tenure, he must be informed of this decision prior to the end of the academic year preceding his last year of appointment. For purposes of this exercise, it is assumed that a decision, which, according to AAUP requirements, must be made during the latter part of the spring semester prior to the last year of service, can be reported just prior to the start of the fall semester. Tenured faculty are denoted by a "(T)" after their names on the game forms. A faculty member into his last year of probationary employment and who will be earning tenure unless notified to the contrary will be entering a period of defacto tenure. This will be noted as "(dt)".

It will also be assumed through this simulation exercise that instructors are appointed on a yearly basis. As a result, it will not be necessary to provide the one year notification in the non-reappointment of instructors. A decision not to reappoint an instructor can be made prior to the start of the spring semester of the last academic year in which that faculty member is to serve. In summary then, the non-reappointment of non-tenured professors, associate professors, and assistant professors must be made with the fall semester decision and just prior to the individual's last academic year of service. The non-reappointment of an instructor can be delayed one semester and made prior to the start of the spring semester in the last year of that individual's appointment.

Within a university, tenure decisions are ordinarily initiated by the department head after consultation with the senior tenured faculty of the department. For purposes of this exercise, it will be assumed that the persuasive power of the department head is such that his recommendation will carry the concurrence of this faculty advisory group. In some instances, non-reappointment decisions will be made at a level higher than that of the department head. In effect, and in particular if the dean begins to lose confidence in the decision making capability of the department head and his advisory committee, a non-tenured faculty member may be non-reappointed at the discretion of the dean.

Promotions

Recommendations for promotion are initiated by the department head and this recommendation is made at the beginning of the spring semester. Promotions should be on the basis of merit and would include the teaching effectiveness of the individual faculty member, his research activity, level of scholarly achievement, and professional service in addition to the length of service in the present rank. The weighting of these factors will be influenced by the departmental objectives and the relative importance attached to each by the department head.

The restrictions on the numbers of faculty in senior ranks, described in the earlier section on recruitment, apply to this promotion process. As

a result, promotion recommendations have to be made with care as with the allotment of any scarce resource or incentive. At the same time, the promotion of a faculty member to the next higher rank is a visible and significant indication of the positive accomplishments of that faculty member. On the other hand, faculty dissatisfaction with the promotion process may result in the resignation of a faculty member who believes he should be promoted when in fact he is not. In the game model, it is assumed that the department head's recommendation is adequate to insure promotion.

GAME OUTPUT AND INPUT

The Academic Department Game commences with the beginning of the fall semester 19X1. The output provided for the player and the input decisions required of the player at that time are noted in Figure 1. A sample of the fall semester materials is shown in Figures 2, 3 , and 4.

The Dean's Report in Figure 2 essentially tells the player how well he and the department are "measuring up" to the dean's expectations for this department. The report covers all areas of departmental productivity as well as the composite teaching report on the faculty in the department. Obviously, not all the factors listed are equally important. The dean is reviewing the department's progress for the academic year just ended prior to the beginning of the fall semester. This report should indicate to the player the areas in which his efforts for the coming year might be concentrated.

The Fall Semester Administrative Report, shown in Figure 3, provides pertinent information on the number of authorized faculty positions for the academic year following the one being played. The recruiting process will have to be based, in part, upon this information.

The Professor Profile for the fall semester (Figure 4) provides, in compact form, data on each of the faculty members in the department. The satisfaction report covers all of the areas previously indicated. This information should be used by the player in order to make more responsible decisions concerning his faculty members.

The player is required to indicate which positions, if any, he would like to fill by means of the recruiting process. He must also make the fall semester teaching assignments for each of his existing faculty members.

Examples of the spring semester output are shown in Figures 5 and 6. The resume report (not shown) provides a list of those professors in the labor pool who have submitted their qualifications for consideration to fill the available position(s) in your department. The Spring Semester Administrative Report indicates the number of salary dollars available for increases to be effective during the coming academic year.

The Professor Profile (Figure 6) is again included for each of the professors in the department. The scholarly productivity report indicates the professor's actual accomplishments as well as his teaching effectiveness during the calendar year just ended.

In the spring semester the player is also required to make any employment offers in order to fill the open position(s). The decision whether to make an employment offer is based upon the resumes he has received. Non-reappointment decisions, as well as teaching assignments must be made for each of the faculty members in the department.

This information and decision process then repeats during each subsequent semester of the game play. These output reports may not provide the composite information required by the player. The conscientious player will supplement this information with tables of his own.

Fall Semester 19X1	Spring Semester 19X2

OUTPUT:
1. Dean's Report
2. Administrative Report
3. Professor Profiles

INPUT:
1. Resume Requests
2. Teaching Assignments

OUTPUT:
1. Resume Report
2. Administrative Report
3. Professor Profiles
   a. Scholarly Productivity Report
   b. Graduate Student/Research Report

INPUT:
1. Recruiting Preferences
2. Promotion Recommendations
3. Salary Recommendations
4. Teaching Assignments
5. Non-Reappointments

FIGURE 1. SCHEMATIC OF THE GAME OUTPUT AND INPUT

DEAN'S REVIEW OF DEPARTMENT PRODUCTIVITY

1. TEACHING REPORTS

   DISSATISFIED

2. NUMBER OF ARTICLES AND PAPERS PUBLISHED

   SATISFIED

3. NUMBER OF BOOKS PUBLISHED

   DISSATISFIED

4. AMOUNT OF SPONSORED RESEARCH GENERATED

   EXTREMELY DISSATISFIED

5. INVOLVEMENT BY PROFESSORS IN UNIVERSITY SERVICE

   SATISFIED

6. INVOLVEMENT BY PROFESSORS IN NATIONAL SERVICE

   SATISFIED

7. CONSULTING ACTIVITIES

   SATISFIED

8. OVERALL ACHIEVEMENT

   DISSATISFIED

FIGURE 2. DEAN'S REPORT

FACULTY POSITIONS TO BE AVAILABLE DURING ACADEMIC YEAR 19X2 - 19X3

8

POSITIONS TO BE FILLED

STOCHASTIC PROCESSES

ASST. PROFESSORS_____

ASSOC. PROFESSORS_____

PROFESSORS_____

DESIGN OF EXPERIMENTS

ASST. PROFESSORS_____

ASSOC. PROFESSORS_____

PROFESSORS_____

NON-PARAMETRIC STATISTICS

ASST. PROFESSORS_____

ASSOC. PROFESSORS_____

PROFESSORS_____

PROFESSORIAL INTERVIEWS TO BE SCHEDULED THROUGH THE YEAR
(LIMIT OF TWO PER POSITION TO BE FILLED)

_____

FIGURE 3. ADMINISTRATIVE REPORT - FALL SEMESTER

ASSOC. PROF. WASHINGTON (T) IDENTIFICATION NUMBER = 13

YEARS OF SERVICE IN THE DEPARTMENT = 9

FACULTY SATISFACTIONS REPORTED FOR ACADEMIC YEAR ENDING JUNE 31, 19X1

SALARY	EXTREMELY DISSATISFIED
TEACHING LOAD	SATISFIED
TEACHING PREFERENCE	SATISFIED
DEPARTMENT REPUTATION	EXTREMELY SATISFIED
NUMBER OF GRADUATE STUDENTS	DISSATISFIED

NUMBER OF GRADUATE STUDENTS TO BE SUPERVISED BY THE PROFESSOR DURING THE ACADEMIC YEAR 19X1 - X2 = 3

SPONSORED RESEARCH IN EFFECT DURING THE ACADEMIC YEAR 19X1 - X2 ,(%TIME), = 0.0

TEACHING ASSIGNMENT FOR THE FALL SEMESTER 19X1

NUMBER OF COURSES ASSIGNED = ----------

COURSE NUMBERS: ----------, ----------, ----------, ----------

FIGURE 4. PROFESSOR PROFILE - FALL SEMESTER

EMPLOYMENT OFFERS (IN ORDER OF PREFERENCE)

NAME	RECOMMENDED RANK
1. ----------	----------
2. ----------	----------
3. ----------	----------
4. ----------	----------
5. ----------	----------
6. ----------	----------

SALARY INCREASE MONIES FOR THE ACADEMIC YEAR 19X2 - X3 = $7,000.00

FIGURE 5. ADMINISTRATIVE REPORT - SPRING SEMESTER

PROF. DAVIS (T) IDENTIFICATION NUMBER = 1

SCHOLARLY PRODUCTIVITY FOR CALENDAR YEAR ENDING DECEMBER 31, 19X1

ARTICLES AND PAPERS PRESENTED OR PUBLISHED:

ROBUST ESTIMATION OF A LOCATION PARAMETER, THE ANNALS OF MATHEMATICAL STATISTICS

RELATIONS BETWEEN CRUDE AND LIFE TABLE DEATH RATES, JOURNAL OF THE ROYAL STATISTICAL SOCIETY

ON THE DISTRIBUTION OF SOME TIME AVERAGES OF SHOT NOISE, TECHNOMETRICS

MIXED EXPONENTIAL ESTIMATION BY THE METHOD OF HALF MOMENTS, APPLIED STATISTICS

BOOKS PUBLISHED: NONE

SPONSORED RESEARCH: $25,000 GRANT RECEIVED

UNIVERSITY SERVICE: 1 MAN-HOURS PER WEEK

NATIONAL SERVICE: 6 MAN-DAYS PER YEAR

CONSULTING ACTIVITY: 0 MAN-DAYS PER YEAR

TEACHING REPORTS FOR PERIOD ENDING DECEMBER 31, 19X1: ABOVE AVERAGE

SALARY INCREASE RECOMMENDATION:

CURRENT SALARY $ 18000.00 RECOMMENDED INCREASE $_____

NUMBER OF GRADUATE STUDENTS BEING SUPERVISED BY THE PROFESSOR DURING THE ACADEMIC YEAR 19X1 - X2 = 4

SPONSORED RESEARCH IN EFFECT DURING THE ACADEMIC YEAR 19X1 - X2 ,(%TIME), = 0.0

TEACHING ASSIGNMENT FOR THE SPRING SEMESTER 19X2

NUMBER OF COURSES ASSIGNED = _____

COURSE NUMBERS: _____, _____, _____, _____

FIGURE 6. PROFESSOR PROFILE - SPRING SEMESTER

BASIC MODEL GAME

The game model has been constructed about an individual data base which maintains information relevant to each faculty member. The specific values of the various parameters have been developed with the assistance of a consulting psychologist. Each faculty member is characterized by several factors including stress factors for salary, rank, teaching load, teaching preference, the department reputation, and the number of graduate students attracted. Included also is a response level for each of the stress factors.

Each faculty member is also characterized by indices regarding his level of scholarly productivity. These preprogrammed productivity levels are for such items as articles produced, books produced, sponsored research, university service, national service, and consulting activity. It is through the use of these that productivity may be observed. The professor is characterized in the data bases by best possible productivity (BPP) indicators. These indicators range from a high factor to a low factor (3.0-1.0) for each area of scholarly productivity.

This BPP factor is employed in the development of actual productivity measures for each professor. It is modified by calculations which include such factors as total yearly teaching load and the number of graduate students under supervision.

The general method of calculation in the game for actual productivity (AP) is to determine a detraction factor (DF) which reduces the BPP in any given year. The DF is calculated by

$$DF = \left(\text{Number of Courses} + \frac{\text{Number Grad. Students}}{8.0}\right)/5.0$$

where each eight graduate students are assumed to require the same time as one standard course. Then actual productivity AP is determined by

$$AP = (BPP - DF) \times (\text{Area Scale Factor})$$

for a given area for a given year. For example, in the production of articles, assume the profile of a given professor of BPP = 3.0 for a given year. Assume also, the professor had been assigned six courses over the year and had no graduate students working with him in this case

$$BPP = 3.0$$

$$DF = (6 + 0/8)/5 = 1.2$$

Then

$$\begin{aligned} AP &= (BPP - DF) \times \text{Scale Factor} \\ &= (3.0 - 1.2) \times (3.0) \\ &= 5.4 \\ &\approx 5.0 \end{aligned}$$

In a similar manner the basic tendencies of the professional staff to contribute to scholarly activity can be preprogrammed over the length of the

game. It allows certain people to be characteristically book producers, or article producers or anything else that is desirable. Further, it allows for logical situations to occur when, for instance a professor works on producing articles for several years and then changes objectives for a year or two to book writing. This case could be characterized by the following set of BPP factors.

YEAR	1	2	3	4	5
ARTICLES	3	3	1	1	3
BOOKS	1	1	3	3	1

This would be reasonable for a man who compiled his articles for two years and then spent a year or two writing a book.

By employing the BPP factors, an individual's "ideal" productivity profile may be constructed to be consistent with his written profile. This ideal productivity is then modified by those factors which detract from it. The magnitude of these detraction factors is a function of player decisions. The BPP table for a typical professor is shown below for a five year period.

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
ARTICLES	3	3	2	2	1
BOOKS	1	2	3	3	3
SPONSORED RES.	3	2	2	1	1
UNIVERSITY SERVICE	1	1	1	1	1
NATIONAL SERVICE	1	1	1	1	1
CONSULTING	2	2	2	2	2

This particular professor has little love for either university service or national service, but concentrates upon articles and books as the main activity.

The quality of the department and the faculty over time is dependent upon being able to attract good people and then to keep them satisfied. In this regard, faculty satisfaction is a very large aspect of the game. Faculty response to various aspects of the work assignment and reward system has been incorporated into the model. The faculty member responds to the department head on his satisfactions regarding his teaching preference, salary, teaching load, number of graduate students, department reputation, and rank. In general the satisfaction in a given year is a function of the previous years' satisfaction, the individual's stress factor to that item, and the departmental average for that item. Generally,

$$\text{Satisfaction in Year(I)} = (\alpha)\ \text{Satisfaction in Year (I-1)} + (1-\alpha)\ \text{Determined Satisfaction Calculation}$$

where α is an exponential-type smoothing constant. For example, in the area of salary, this relationship becomes

$$\text{Satisfaction}(I) = \alpha\ \text{Satisfaction}\ (I-1) + (1-\alpha)\ \left(\frac{\text{Individual Raise-Average Raise}}{\text{Average Raise}}\right)$$

Similarly, teaching load satisfaction is calculated as

$$\text{Satisfaction}(I) = \alpha\ \text{Satisfaction}\ (I-1) + (1-\alpha)\ \left(\frac{\text{Average Load-Individual Load}}{\text{Average Load}}\right).$$

In this manner each of the other aspects of employment are given a response by the faculty member. The level of response is of course a function of the individual preferences of the faculty, i.e., one man may be very sensitive to financial reward while another is very sensitive to teaching load.

Once the individual satisfactions are determined they are compiled to form an aggregated satisfaction. The relative value of this measure is used to determine whether or not a faculty member stays or resigns. For each faculty member, threshold values have been set which are used to determine actual response and attrition decisions. In this way the work force has been made sensitive to the quality of the work assignment. Several additional factors have been incorporated into the game which give it relevancy. Among these include the ability to recruit new faculty, the ability of individual faculty to attract graduate students and external funding and the teaching preferences of each faculty member to the course offerings.

CONCLUSIONS

The Academic Department Game was designed as both an orientation and a training device for new department heads, aspiring department heads and others who might profit from a better understanding of some of the significant decision elements in the administration of an academic department. Obviously, the game does not include many decision situations that confront the department on a day by day basis. No requirement is made for the response to a group of students who have come in to complain about the inept teaching of a member of the faculty. The department head in this game is not required to respond to the complaint of a faculty member who can not find a parking place and is habitually late to meet his first class. Even in a broader frame of reference, and other than the allocation of salary increase monies, no provision is included within the game for the stewardship function. The department head in the game is not required to request and maintain a budget. On the other hand, a number of the more profound decisions are required of the game participant. Through the mechanism of the game, he has the opportunity of making decisions, observing the results of these decisions, and then making additional decisions.

The game is now essentially completed. Further testing and refinement of the game model will be conducted through the spring and summer. It is anticipated that the game will be available early in the fall of 1973. Inquiries and/or requests can be addressed to: Dr. Paul E. Torgersen, Dean, College of Engineering, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, 24061.